REGARDING THE HABITS OF TARANTULAS[1] AND THE EFFECTS OF THEIR POISON

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AS one who has grown up north of the Mason and Dixon Line and had seen tarantulas only in collections, I had never given these big hairy spiders any serious thought. However, when I came to the Ozarks of this region and heard some of the weird stories telling how these tarantulas would jump on a person from a distance of 15-25 feet, and how their bite proved almost always fatal, I developed considerable curiosity in regard to these terror-inspiring objects. Upon learning that these spiders are fairly common on the stony hillsides near the college campus, I immediately set to work and in a short time assembled a small collection. It seemed

HOLE OCCUPIED BY TARANTULA, SHOWING THE WEB OVER THE HOLE. NEARLY NATURAL SIZE

[1] *Eurypelma steindachneri* Ausserer, determined by Professor C. R. Crosby, Cornell University.

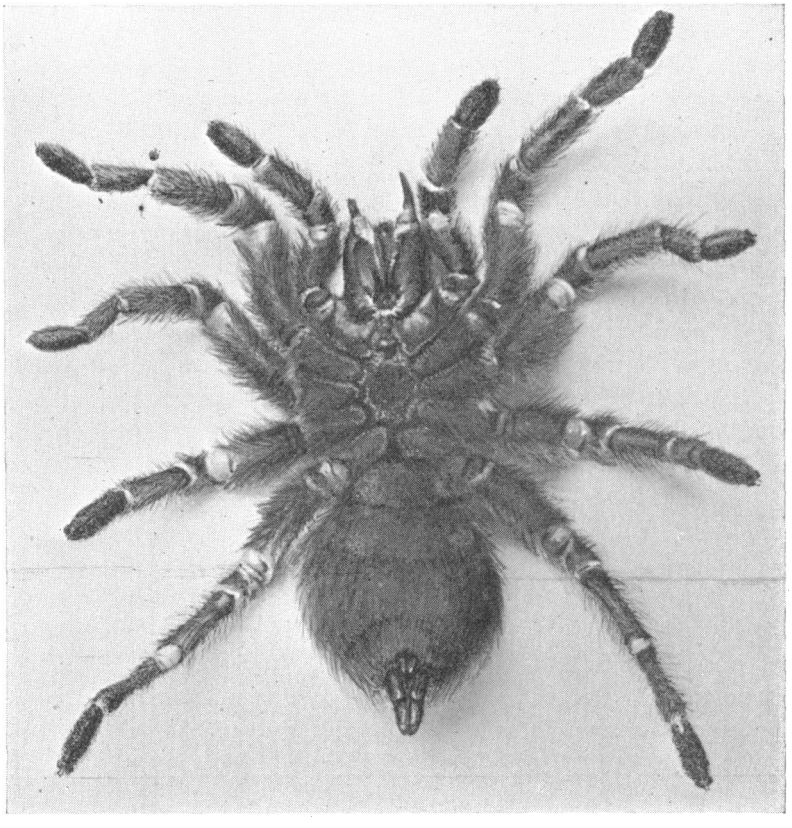
desirable to me, since so little is known about their habits, that I keep a few alive for daily observations.

In the Ozark region the tarantulas are commonly found living in holes. These holes vary from 1½ to 2 inches in diameter and from 8 to 12 inches in depth. They are apparently not made by the spiders themselves, but are appropriated from gophers, ground squirrels and other small rodents. Most of the holes when the spiders are "at home" are covered with a thin webbing, some are merely lined around the edge.

It would seem that flooding these holes with water might be an easy way to get the spiders; but here, as elsewhere, inference is misleading. The simplest way that I have so far found is to insert a slender stick into the hole and gently tease the spider, whereupon it usually proceeds to leave the hole at once.

Having found that a large grasshopper once a week or ten days and a small dish of water solved all the problems of feeding, I encountered no further difficulties in keeping the tarantulas under bell jars on the laboratory table. During the winter the feeding problem is still further simplified, for, although these spiders remain active all through the year; yet they refuse all food from some time in October till about the middle of April, and require nothing but water for their sustenance and well-being.

HOLE OCCUPIED BY TARANTULA SHOWING WEB AROUND THE EDGE OF HOLE. NEARLY NATURAL SIZE



VIEW OF UNDERSIDE OF TARANTULA SHOWING THE BROKEN FANG. NEARLY NATURAL SIZE

One female tarantula, about 2¼ inches long, has now been under observation for more than two years, and is apparently doing very well under the simple diet outlined above.

The process of molting, or shedding the skin, seems sufficiently interesting to be briefly described here. The skin splits around the upper edge of the main body (cephalothorax) in such a way that the entire top from the base of the chelicerae (the arms that operate the fangs) to the base of the abdomen comes off like a lid. The skin of the abdomen may or may not split along the middle of the back.

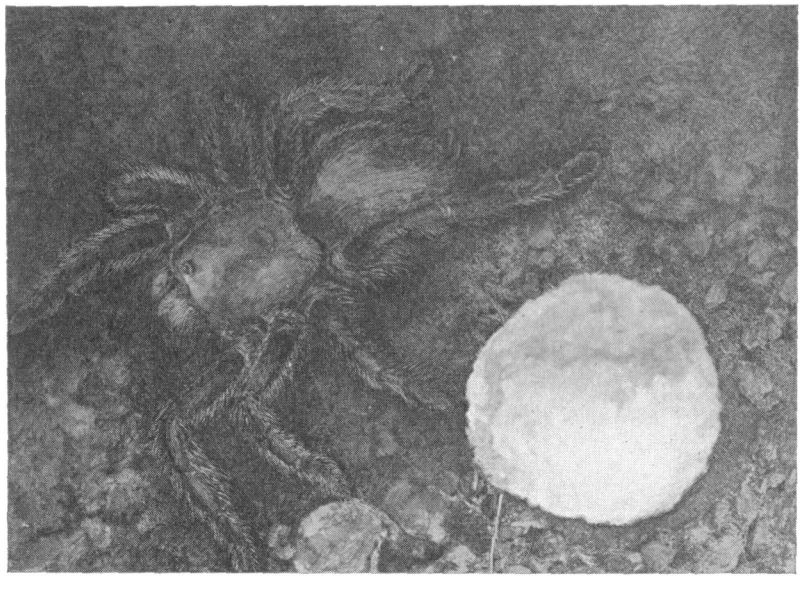
A year ago the molting took place on August 15, this year on August 20. The latter molt occurred from 8 to 11 in the morning and I was able to observe the entire process. The first conspicuous evidence of molting is the lifting of the upper surface of the cephalothorax. This remains attached over only a short distance near the base of the right chelicera.

A significant feature in the process of molting is that it proceeds practically without any visible effort on the part of the tarantula. About all that one is able to observe is that the body by rather faint pulsations gradually oozes out of the old skin, rising up and moving to the left in such a manner that by the time that all the appendages and the abdomen have been extricated from the skin the tarantula is seen lying on its side and facing in the opposite direction of the skin. At this stage the spider turns on its back and begins to exercise its legs in a more or less leisurely manner for about one hour when it gets back on its feet and behaves in the normal way.

Some time this year during the month of May I obtained a large female which was apparently heavy with eggs. Instead of placing her under a bell jar, like the others, I put her into a large battery jar half filled with dirt, thinking that she would probably make some sort of a hole preparatory to egg-laying; but she made no such an attempt.

On the morning of June 28 the spider constructed a large silken bag all around herself and kept busy on the inside of it for some time. On the next day she was on the outside of the bag which had now shrunken to the size of a black walnut without the hull. From now on the tarantula spent practically all her time sitting over the bag.

On July 20 I made a small opening in the bag and took out a



TARANTULA AND EGG SAC. NEARLY NATURAL SIZE

few eggs and young spiders. The eggs are white in color, globular and about two millimeters in diameter. The young spiders match the color of the eggs so well that they are quite difficult to see when small. The young were at this time feeding on the eggs still unhatched. A few days later, July 24, I decided to take out all the eggs and young for further study. The bag contained at this time 460 eggs in apparently good condition, 113 young spiders, and 90 eggs which were shrivelled up. This makes a total of 663 eggs as originally laid. The shrivelled eggs had obviously furnished the food for the young spiders. Hoping that I might get some information on the final result of this struggle for existence, I replaced the eggs and the young spiders in the bag and closed the slit that I had made with some glue. Unfortunately my efforts interferred with the instincts of the spider for on the following morning I found her enjoying a breakfast consisting of her own eggs and young spiders.

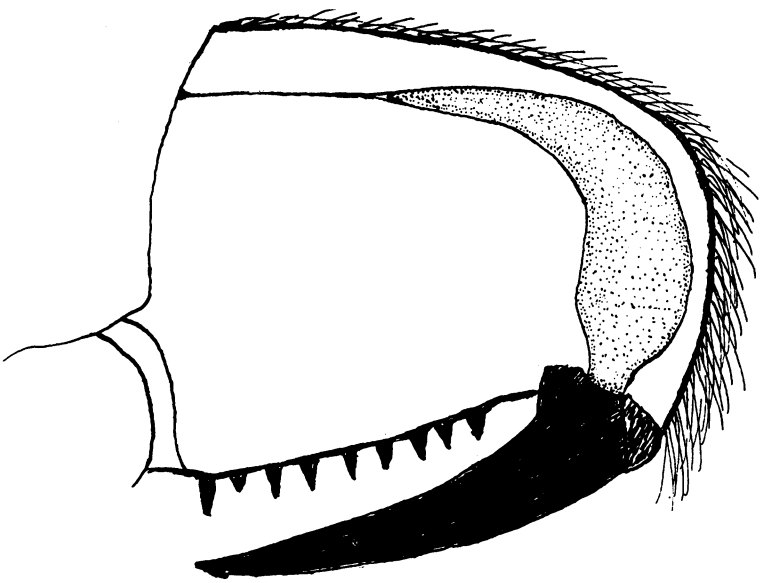
It is well known that tarantulas, in fact all spiders in general, are cannibals. Thinking that I might get some more detailed information on this particular habit, I placed two large females, that had just been brought in from their natural homes, under a large bell jar. Contrary to what might be expected, they were quite peaceable. One sitting quietly on one side of the jar, the other opposite her, behaving much like two persons not on speaking terms. This attitude they steadfastly maintained in spite of my efforts to bring them together. Thus they remained from nine o'clock in the morning till noon, when I left the laboratory. However during my absence, at least one of them must have realized that it was lunch time. On my return at about one o'clock P. M. I found one of the females sitting comfortably on the abdomen of the other and busily feeding on its contents. There was no evidence of any struggle. The dead tarantula was badly torn on the upper surface of the abdomen, but showed no other injury. The victor showed no evidence whatsoever of having been attacked.

It we may judge from these observations, there seems to be no definite fighting spirit. Several individuals apparently tolerate each other till one develops a desire for food.

Recently when an intelligent young man told me that his brother had been bitten by a tarantula and had died as a result a few days later, I decided to make some sort of a study of the effects of the much-dreaded venom.

Accordingly a guinea pig, seven months old and weighing about 635 grams was secured and the experiment was carried out in the following manner. The hair on the inside of the right hind leg

was cut off close to the skin, and then having fastened the leg and holding the pig firmly an attempt was made to have the tarantula implant her fangs on the prepared spot. The spider used in these tests was a large female, whose body measured 2½ inches in length and 1 inch across the thorax. After several attempt it became obvious that she was unable to penetrate the skin of the pig. Consequently in an effort to obtain some evidence on the nature of the poison, the chosen spot on the leg was disinfected with alcohol and treated so as to remove the difficulty in penetration. Hereupon after a little agitation the tarantula proceeded to implant both fangs well into the flesh of the guinea pig's leg. A second trial was made and in this, one of the fangs entered the flesh. Both times when the tarantula struck the guinea pig gave evidence of more or less pain. A number of observations on temperature,



CROSS SECTION OF CHELICERA SHOWING FANG, AND ROW OF TEETH, POSITION AND RELATIVE SIZE OF POISON GLAND. ENLARGED ABOUT TEN TIMES

respiration, etc., were made; but as all of these proved to be of obviously little value, they are omitted here. There developed a slight swelling in the leg which possibly was due mainly to the preparatory treatment. At no time did the guinea pig refuse to use the leg in walking around.

For the next subject I. selected a white rat, about one month old. The tender skin of this animal was an advantage, for the tarantula was easily induced to implant her fangs deeply into the flesh of the inside of the right hind leg, and without any difficulty repeated the act. The four spots where the fangs had penetrated

assumed a reddish appearance; but the blood did not gather in a drop. When the tarantula struck, the rat struggled and gave other evidence of more or less pain.

Since the rat gave apparently a definite response to the effects of the poison, the observations are given here in condensed form. At first, immediately after the tarantula had struck, the rat seemed bewildered. With eyes closed it ran about in the cage holding up the wounded leg. After about 15 minutes it ceased to run and for a half an hour it jumped around in a jerky way. Then it seemed to go into a state of coma. For a half an hour it remained rather quiet with only a sudden movement of the legs now and then. During the two hours following the rat moved about restlessly, holding the wounded leg close to the body. Later it became quiet again and soon began using the wounded leg. Four hours from the time it was bitten the rat opened its eyes and an hour later it behaved as if it had entirely recovered. After several hours it partook of a hearty meal consisting of milk and corn meal.

According to a theory held by nutrition chemists a full-grown rat represents in many ways one thirtieth of a grown man. That is to say that a man requires thirty times the amount of food needed for a rat, etc. Assuming that a man would also require thirty times the amount of spider venom in order to suffer the same agony; I decided to try the "deadly" poison on myself.

On the morning of August 10, I induced the large tarantula, used in the previous tests, to strike me twice on the inside of the small finger of the left hand. In the first attempt the fangs barely penetrated the skin. The second was more successful, at least one of the fangs went well under the skin just below the first joint.

The blood gathered a little in the openings but did not collect in drops. A small amount of the poison, a clear, colorless, and tasteless liquid, was present in all four places where the fangs had struck. The sensation produced by the strike was that of a stab of a pin. This pain, if I may call it a pain, decreased gradually so that two hours after the biting took place no trace of the pain remained. At no time was the finger at all stiff.

On the following day the experiment was repeated. An effort to use another tarantula than the big one used in the previous tests failed, she could not be induced to strike, in spite of all teasing and with fangs conveniently placed on the tender portion of the small finger. So the large female was again brought out and she did not disappoint me. After but little teasing she struck violently twice. At the first strike I felt a strong desire to groan, at the second, in which the spider seemed even more desperate,

she broke her left fang off at the middle. The poison was used more generously than on the day before, two large drops collected and ran down on both sides of the finger. In one of the punctures a small drop of blood collected, the others merely assumed a reddish color.

The pain was very much as has been noted for the previous test, at first fairly sharp and then becoming gradually dull till in about two hours all trace of pain had disappeared.

It should be added that I did not resort to the use of any disinfectants, in fact the punctures were not tampered with in any way. With regard to relative susceptibility to insect poisons, I should probably be considered an average individual. The sting of a bee causes moderate swelling and a pain that lasts for ten or fifteen minutes.